RoboCupRescue - Robot League Team
NIIT-BLUE (Japan)

Adam Jacoff[1], Satoshi Tadokoro[2]

[1] National Institute of Standards and Technology
100 Bureau Drive, Mailstop 8230
Gaithersburg, MD USA 20899
adam.jacoff@nist.gov
http://robotarenas.nist.gov/competitions.htm

[2] International Rescue System Institute
Kobe KIMEC Center Bldg. 2F
1-5-2 Minatojima-Minami-Machi, Chuo-ku, Kobe 650-0047 Japan
tadokoro@rescuesystem.org

1. Team Members and Their Contributions

- Takuya Obata Controller development
- Hitoshi SatoMechanical design
- Tomoya Sioiri
- Takahiro Kobayashi Operator
- Mamoru Kasahara
- Yousuke Fujita Advisor
- Katuji Ogane Sponsor

2. Operator Station Set-up and Break-Down (10 minutes)

Setup
1.Hardware
Confirmation of indirect each part(2 min)
Confirmation of battery(1 min)
Confirming the operation of motor(2 min)
2.Software
Output confirmation of various sensors(1 min)
Wireless confirmation(1 mni)
Confirmation of communication (remotely cereal)(1 min)

It confirms the operation with each parameter and the joystick after the confirmation of item 1.2. (2 min)

In total : 10 min(estimated)

Action method of breakdown

1.Trouble of sensor system

Various sensors have and when the trouble occurs in hard software respect and the disorder is seen in the parameter, the operator has it return to continuation or the operator room according to the situation.

2.Trouble of changeable type crawler

Whether the operator returns to continuation or the operator room according to the remainder time of the game is judged if the trouble's being not able to occur to the crawler, to run, and to fall.

3.Trouble of camera

When the image from the camera is broken off while playing a game and the recovery is hopeless then and there, the operator returns the robot to the operator room.

3. Communications

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MODIFY TABLE TO NOTE ALL FREQENCIES THAT APPLY TO YOUR TEAM		
Frequency	**Channel/Band**	**Power (mW)**
5.2 GHz - 802.11a	34,38,42,46ch / 5.2GHz	8000(mW)

4. Control Method and Human-Robot Interface

The flow of the control method is shown in Fig.1. All sensor information and the motor control are controlled with the H8 microcomputer (Hereafter, it is assumed H8). Information controlled in H8 is fed back to building PC into. Serial communications are used for the means of communication with H8 used when feeding back. Camera information is sent directly to building PC into. It is a control method by which even here is done in the robot. The entire robot is controlled by control PC. As for the method, the operation by building PC into is

output to information by top connecting a remote disk on control PC side. The robot is moved with the joystick based on the information.

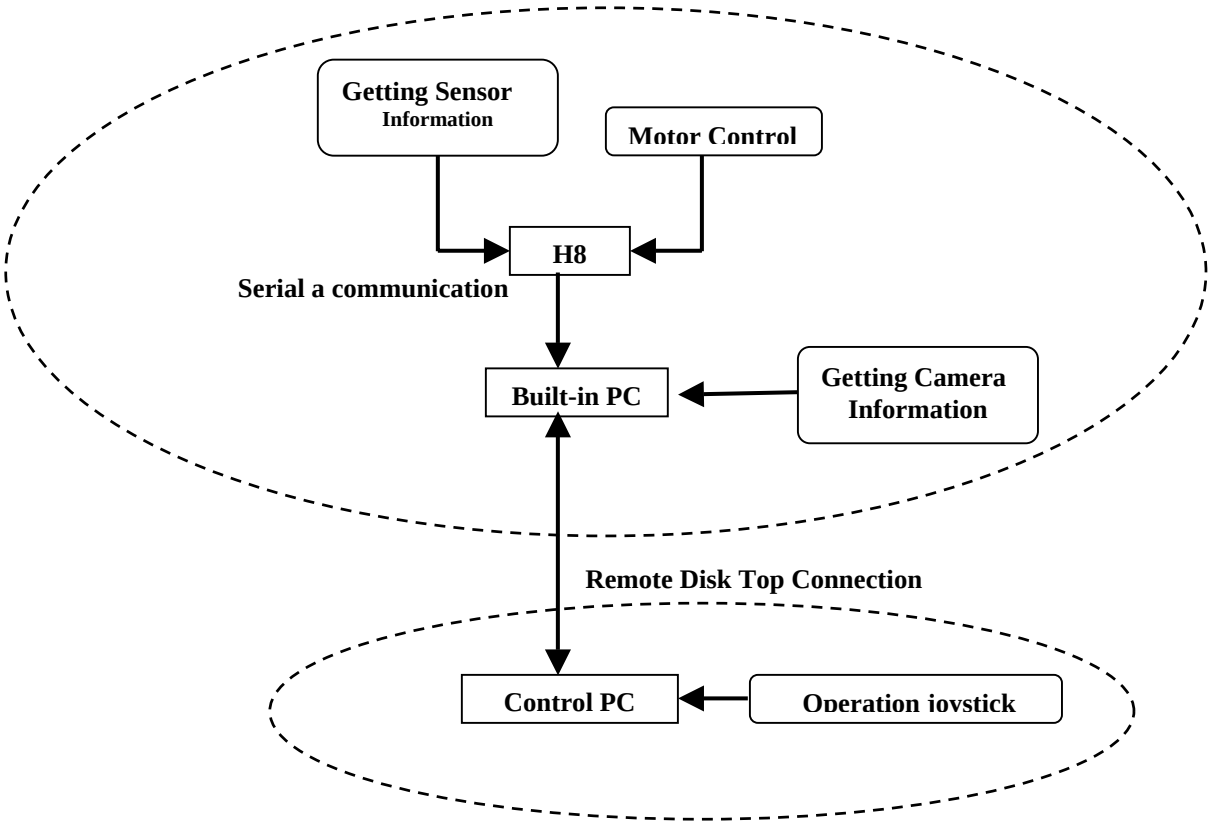


Fig.1-1 The Control Method

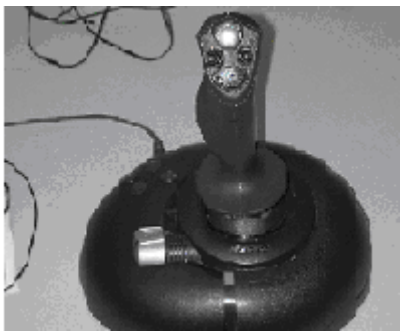


Fig.1-2 A joystick fort he Control

5. Map generation/printing

When the mapping is done, it is assumed an auto mapping that depends on the camera.
When the mapping is impossible, a map hand-written from right above is made based on the image from the camera.
The one that becomes the victim and the sign always takes notes. The size of the form is still being examined.

6. Sensors for Navigation and Localization

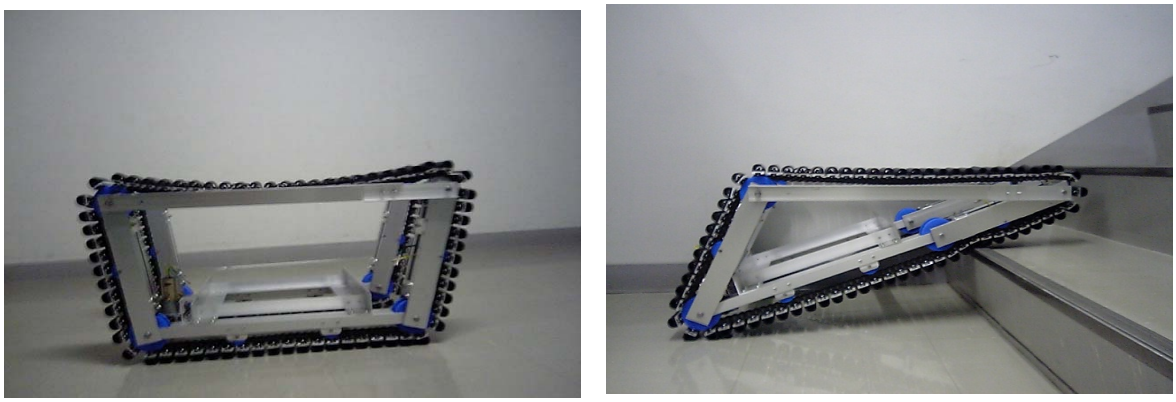
The distance sensor: The distance to the obstacle is detected. The collision with the obstacle in the stricken area is evaded.
The terrestrial magnetism sensor: The direction in which the robot is turning is detected.
The acceleration sensor: The inclination of the robot is detected.
Two eye digital stereovision: It is possible to detect it smoothly by the depth of the site because it equips it with two CCD cameras of two eye high resolution 1024x768. Moreover, it is possible to use it enough also for the victim search activity because it is suitable for dynamic recognition like the gesture recognition, the person pursuit, and the obstacle detection, etc.

7. Sensors for Victim Identification

The human body detection sensor: The survivor is detected by perceiving he originated heat from the human body.
The sound sensor: The survivor is detected by perceiving the voice.

8. Robot Locomotion

It provides with four arms in the front, back, left and right that operate in transportation. The arm part is raised, and the state to suppress the entire length is flexible shape (Fig.2-1), and it changes into shape with high running ability by moving the arm part according to the obstacle, and transforming the shape of the crawler. (Fig.2-2)



(1) Small turning circle form (2) High running ability form

Fig.2 Transformable crawler

9. Other Mechanisms

At first the display improved cheapness by having piled up information on the sensor to the image of the camera Fig.3 .

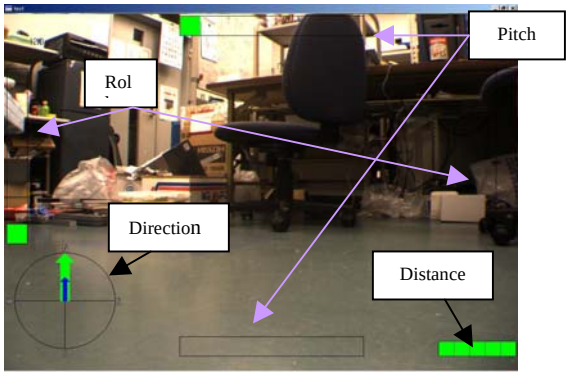


Fig.3 The presented interface

10. Team Training for Operation (Human Factors)

It is thought that there is a limit when it is only an image of the camera and output information on the sensor. I think that supporting the operator by providing an autonomous function for the robot is necessary.

11. Possibility for Practical Application to Real Disaster Site

The robot has an autonomous function and the operator's load is decreased. The position of the robot is always understood by providing the robot with the transmitter or the sensor, and the staff who can smoothly collect it is prepared.

12. System Cost

TOTAL SYSTEM COST (per robot): 15810 (Japanese Yen)

KEY PART NAME: Dual Axis Accelerometer
PART NUMBER: ADXL202E
MANUFACTURER: ANALOG DEVICES
COST: 2000 (Japanese Yen)
WEBSITE: www.**analog**.com/jp/prod/0,2877,ADXL202,00.html
DESCRIPTION/TIPS:
Please fill in this section with a description of how you used the part, its effectiveness, and any helpful tips you may have.

KEY PART NAME: Digital Compass Module
PART NUMBER: RDCM-802
MANUFACTURER: GEOSENSORY
COST: 3800 (Japanese Yen)
WEBSITE: http://www.geosensory.com/rdcm-802.htm
DESCRIPTION/TIPS:
Please fill in this section with a description of how you used the part, its effectiveness, and any helpful tips you may have.

KEY PART NAME: Ultrasonic Sensors
PART NUMBER: BTE054 US Sensors 2
MANUFACTURER: Best Technology
COST: 7300 (Japanese Yen)
WEBSITE: http://www.besttechnology.co.jp/
DESCRIPTION/TIPS:
Please fill in this section with a description of how you used the part, its effectiveness, and any helpful tips you may have.

KEY PART NAME: General Purpose Type Distance Measuring Sensors
PART NUMBER: GP2D12
MANUFACTURER: SHARP
COST: 820 (Japanese Yen)

WEBSITE:
http://www.sharp.co.jp/products/device/lineup/data/pdf/datasheet/gp2d12_j.pdf

DESCRIPTION/TIPS:

Please fill in this section with a description of how you used the part, its effectiveness, and any helpful tips you may have.

KEY PART NAME: Motion Sensors
PART NUMBER: AMN12111
MANUFACTURER: Matsushita Electric Works
COST: 1890 (Japanese Yen)
WEBSITE: http://www.nais-e.com/sensor/

DESCRIPTION/TIPS:

Please fill in this section with a description of how you used the part, its effectiveness, and any helpful tips you may have.